Langley Management System (LMS)
Policy Manual
LMS-PM Revision: C

Original signed by J. F. Creedon
Center Director

NASA Langley Research Center (LaRC)
Langley Management System (LMS)

Verify that this is the correct revision before use by checking the
LMS Web Site at http://lms/

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1.0 Introduction

This policy manual describes the Langley Management System (LMS) at NASA Langley Research Center (LaRC). This manual is intended for use by LaRC Civil Service employees, product users, funders, contractors, internal assessors and external auditors.

The primary objective of NASA LaRC is to deliver effective technical results and services on behalf of the U.S. Government. This manual establishes policies and procedures that govern how LaRC delivers technical results and services to meet employee, product-user, and funder expectations, through efficient management and execution of approved programs and projects. All activities at LaRC are designed to support the LaRC Mission (the LaRC Quality Policy):

In alliance with industry, other agencies, academia, and the atmospheric research community,

we undertake innovative, high-payoff, aerospace and scientific activities beyond the risk limit or capability of commercial enterprises

and deliver validated technology, scientific knowledge, and understanding of the Earth's atmosphere.

Our success is measured by the extent to which our research results improve the quality of life.

The day-to-day operation of LaRC is managed by NASA LaRC civil service personnel with support provided by contractors. The range of activities that produce technical results and services are diverse and include: piloted simulation evaluations of flight deck systems, destructive evaluations of structural components, wind-tunnel evaluations of advanced aerospace vehicle concepts, and development of space-based instruments to study the effects of ozone depletion on the atmosphere.

1.0.1 Langley Management System Scope

This Policy Manual applies to all direct and enabling functions performed by NASA LaRC civil service personnel to accomplish approved research programs and projects. Contractor operations are not included in the scope of the LMS.

1.0.2 Registration Certificate Scope Statement

All civil service activities associated with development and delivery of aerospace vehicle systems technologies and scientific research of the Earth’s atmosphere.

1.1 Management System Goals, Objectives, Performance Indicators, and Responsibilities

1.1.1 Strategic and Quality Framework (SQF)

LaRC senior management developed the Strategic and Quality Framework (SQF) which includes the NASA Vision, LaRC Mission, LaRC Values, Critical Success Factors, and Strategic and Quality Goals. The framework was designed to be an enduring, overarching structure for management of the Center.

Values

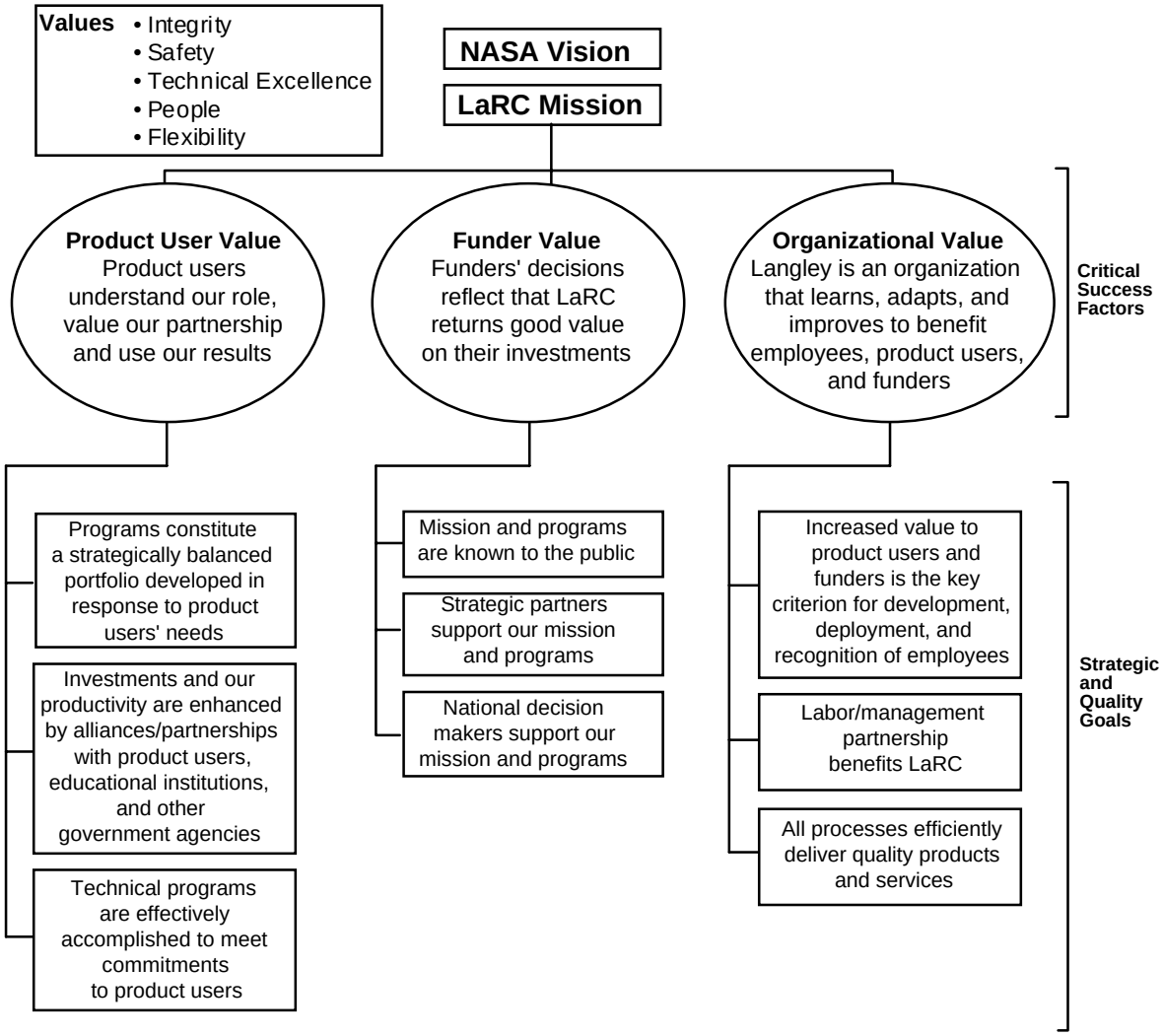
Integrity - We are committed to maintaining the highest level of ethical conduct in fulfilling our responsibilities to funders, product users, suppliers and coworkers.

Safety – We achieve the maximum level of safety in accomplishing our missions and in protecting the general public, astronauts and flight crews, employees, and high-value equipment.

Technical Excellence - Our products and services are recognized by product users, funders and peers to be of exceptional significance.

People - A highly skilled diverse workforce is our most important resource. Every individual is valuable and deserves respect. We create an environment that fosters commitment, innovation, trust, teamwork, and continuous improvement.

Flexibility - We adapt and thrive in an environment of continual change, both as an organization and as individuals.



The Strategic and Quality Framework (SQF)

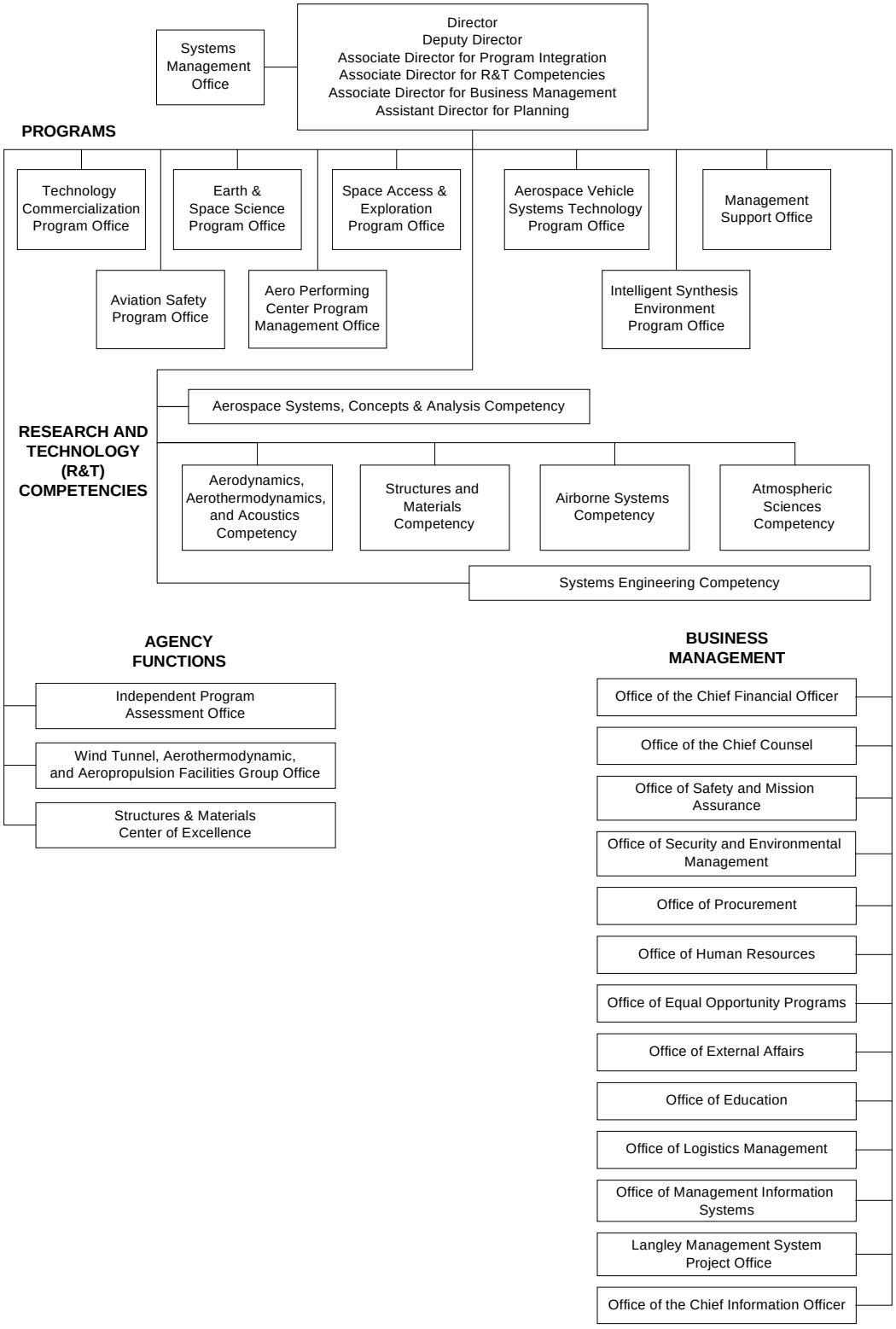
Critical Success Factors and Strategic and Quality Goals

The Critical Success Factors are the outcomes that must occur for LaRC to achieve its mission. LaRC's success depends on product users valuing the Center's programs, funders understanding the Center's value to the nation, and employees, through use of the management system, creating increased value for product users and funders.

Strategic and Quality Goals are defined to provide further definition of the Critical Success Factors. Both the Critical Success Factors and the Strategic and Quality Goals are enduring; they do not change as programs change. The Critical Success Factors are supported by one or more metrics that are used to assess progress.

1.1.2 Organizational Responsibilities and Structure

There are over 2300 full-time, permanent civil service employees in the LaRC workforce, deployed in the organizational units shown below.



The LaRC Organizational Structure

Each organizational unit (OU) is led by an organizational unit manager (OUM) responsible for operations. Each OUM ensures that resources - that is, people, equipment, budget, and facilities - are commensurate with OU commitments. Objectives for each OU are documented in an Organizational Unit Plan (OUP) reviewed and approved by the Office of the Director.

A full-time management representative has been appointed by the Center Director to provide strategy and guidance to the Center Director and Center senior management on LMS implementation. The Management Representative reviews and recommends approval of the following LMS documentation to ensure effective and efficient operations, continual improvement, and desired strategic direction of the Center:

- Policy Manual and Organizational Unit Plans
- Directives, Center and Organizational Procedures

The role involves maintenance of the LMS, resolution of issues relating to the system, and performance reporting to the Strategic and Quality Management Council (SQMC).

The management system is reviewed quarterly by the senior staff to assess its effectiveness and LaRC performance. In addition, an annual review of progress towards critical success factors is performed by the SQMC. Required changes to the LMS as a result of management review are controlled and implemented through the Corrective and Preventive Action Tracking System (CAP Tracs).

The procedures relating to management responsibility activities are described in the following documents:

Reference	Document Title	Application
LMS-CP-0002	Annual Measurement, Integrated Analysis and Management Reporting/Review of Performance	Performance of work
LMS-CP-0006	Strategic Implementation Planning	Performance of work
LMS-CP-0009	Langley Management System Quarterly Management Review (QMR)	Performance of work

1.2 Langley Management System and Program and Project Planning

The LMS is an integrated system used to meet product user, funder, and employee expectations. The LMS controls the identification of the product user, funder, and employee requirements, the development and deployment of a Center plan to meet those requirements, the delivery of products and services according to the Center plan, and measurement of Center performance in relation to the Strategic and Quality Framework.

The LaRC Implementation Strategy describes future program and Center resource planning. NASA Enterprise Strategic Plans, NASA Functional Office Plans, and LaRC management information are used as input for the development of the LaRC Implementation Strategy. The document is used to guide LaRC planning and develop competency requirements to meet anticipated program needs.

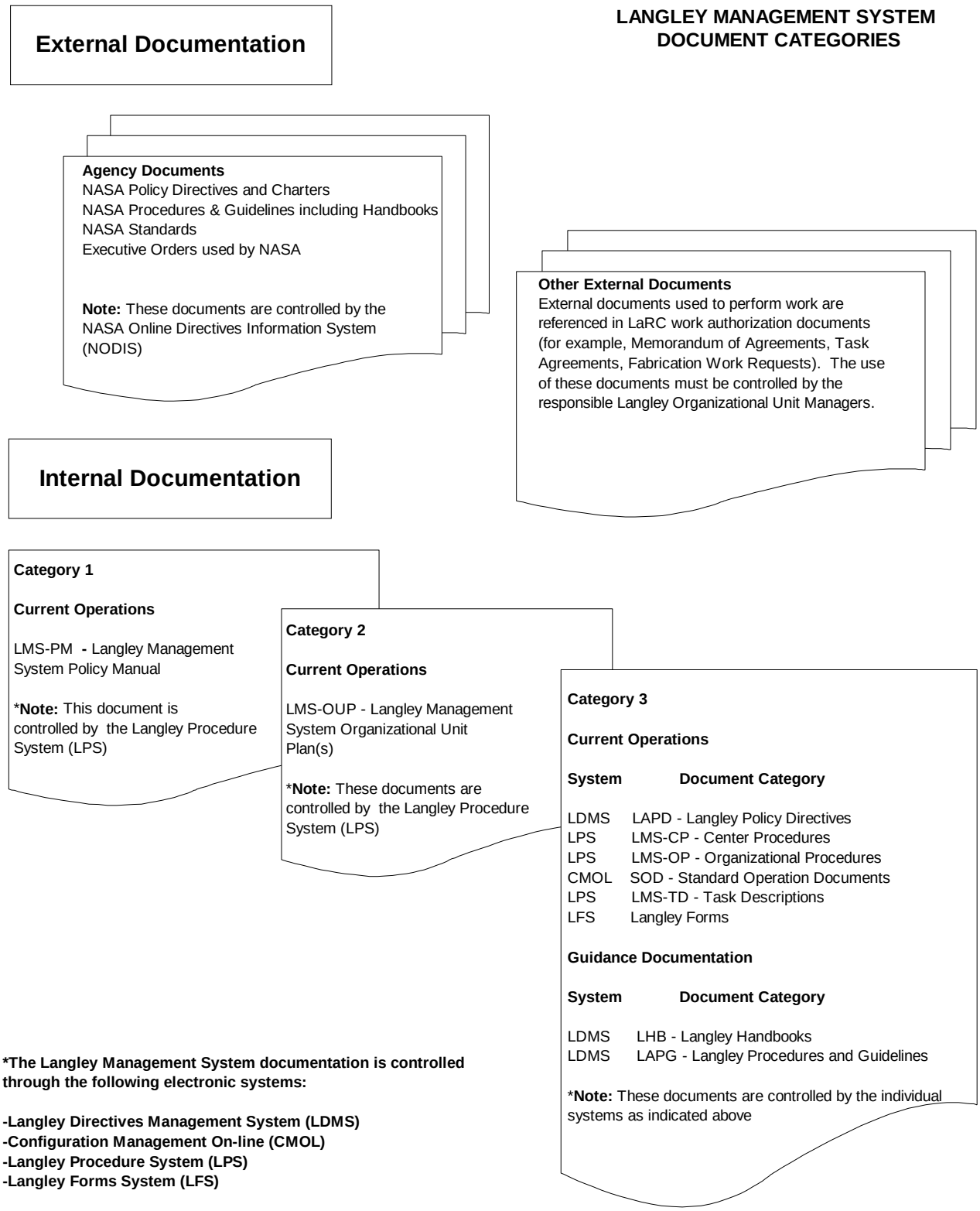
The LaRC Implementation Plan summarizes LaRC commitments to NASA Enterprises, NASA Functional Offices, and other Government agencies. The LaRC Implementation Plan bridges Agency strategic direction with LaRC's implementation of program and project plans, memoranda of agreement/understanding, and Headquarters' functional directives.

Program and project planning is a necessary activity to control new and unique product user and funder requirements that are not described in the LMS. Program and project plans, design plans and work authorization documents are all used to enable our employees to meet program and project milestones.

In addition to Agency and LaRC Directives, Center procedures (CP's) are documented processes used by employees in more than one OU. Organizational procedures (OP's) are documented processes used only by employees in a single OU. LaRC management does not permit more than one CP or OP for a specific process. Task Descriptions and Standard Operation Documents are used to control work activities performed by small subsets of the OU. CP's and OP's are cross-referenced in this policy manual. The application of each procedure referenced is also identified to

describe the role of the civil servant. These applications are broken into management, performance, and verification of work activities.

The following documents describe the LMS:



1.3 External and Internal Agreements

Approval of the Office of the Director is required to commit the Center to new work. Each OUM has the responsibility to ensure that their OU has the capability to manage and perform work. External and internal agreements required to meet product user and funder requirements are developed by each OUM as described in the Table 1 below. It is the responsibility of each OUM to ensure agreements are in place to meet product user, funder, or LaRC requirements and that employees understand those requirements.

Table 1. Internal and External Agreements

Organizational Units	Method	Type of Agreement
Office of the Director	LaRC Implementation Plan Organizational Unit Plan (OUP)	External Internal
Program Offices	Program Commitment Agreement (PCA) Program Plan Project/Element Plan Proposal Space Act Agreement (SAA) Interagency Agreement (IA) Industry Task Agreement Organizational Unit Plan (OUP)	External External External and Internal External External External External Internal
R & T Competencies	Space Act Agreement (SAA) Interagency Agreement (IA) Proposal Task Agreement (TA) Wind Tunnel Test Agreement Aerospace Systems Work Request/Agreement Organizational Unit Plan (OUP)	External External External and Internal External and Internal External and Internal Internal Internal
Business Management Offices	Space Act Agreement (SAA) Interagency Agreement (IA) Annual Operating Agreement Organizational Unit Plan (OUP)	External External External and Internal Internal

External agreements are referenced in each Organizational Unit Plan. Task Agreements, formerly Research and Technology Agreements (RTA), define resources required to achieve milestones described in Proposals, Project/Element Plans, or Program Plans and establishes the contract between Program Offices and Competencies for accomplishing research objectives.

Progress towards meeting designated program and project commitments is monitored by the Center Program Management Council (CPMC). The CPMC has been delegated responsibility to ensure that responsible managers take remedial actions when the following situations exist:

a) Delays in meeting planned milestones
b) Actual costs or workforce exceed planned costs or workforce during the implementation phase
c) Unacceptable risks to planned costs, schedules and/or mission performance have been identified

The procedures used to control external and internal work agreements are described in the following documents:

Reference	Document Title	Application
LMS-CP-0101	Technical Monitoring of Partnerships Through Joint Sponsored Research Agreements (JSRA)	Performance of work
LMS-CP-0501	Response to Wind Tunnel Test Requests	Performance of work

Reference	Document Title	Application
LMS-CP-0921	Plan Airborne Systems Research	Performance of work
LMS-CP-0923	Requests for Simulation and/or Flight Assets	Performance of work
LMS-CP-1102	Lead Center Program and Project Planning and Replanning	Performance of work
LMS-CP-1340	Proposal-Based Research and Analysis (R&A) for Atmospheric Sciences	Performance of work
LMS-CP-1714	Management of Partnerships through Memoranda of Agreement (MOA) and Patent Licenses	Performance of work
LMS-CP-1719	Development and Approval of Space Act Agreements (SAA) to Support Interagency and Non-Commercialization Partnerships	Performance of work
LMS-CP-1903	Development of Task Agreements (TAs)	Performance of work
LMS-CP-1905	Obtaining Approval for New Business	Performance of work
LMS-CP-2901	Coordination of Support for New Business Development	Performance of work
LMS-CP-5502	Systems Engineering Requirements Definition & Implementation Planning for Research Projects/Experiments	Performance of work
LMS-OP-0003	Development and Implementation of the Langley Research Center Funder/Product-User Visit Plan	Performance of work
LMS-OP-5303	Structures and Materials Requirements Definition	Performance of work

1.4 Design Control of Systems and Components

Software and hardware design is performed by the Research and Technology Competencies. Design/development plans are generated and include the control of contracted design activities. These plans are revised to reflect current activity, ensuring all user requirements are met.

Design requirements are gathered to determine the extent of control that will be exercised over design/development and associated test activities. Consideration is given to the frequency and formality of reviews and at which stages of implementation the verification and validation activities will be performed. Reviews, verifications, and validations are planned and documented.

Design reviews are performed based on the criticality, complexity, and cost implications relating to required system performance. During design/development review activities, verification and validation instructions and/or checklists are reviewed for adequacy.

Design changes are managed using approved configuration management plans for each project or design/development activity.

The procedures used to control design of systems and components are described in the following documents:

Reference	Document Title	Application
LMS-CP-0508	Design and Development of Model and Instrumentation Systems	Performance, verification, and management of work
LMS-CP-1360	Planning, Definition, and Development of Instruments within Atmospheric Sciences	Performance of work
LMS-CP-4754	Quality Assurance (QA) for Software Development and Acquisition	Performance of work
LMS-CP-4890	Construction and Change Assurance for High Risk Facilities	Performance of work
LMS-CP-5503	Aerospace Systems Studies or Advanced Development within Systems Engineering	Performance of work
LMS-CP-5504	Aerospace Systems Design within Systems Engineering	Performance, verification, and management of work

Reference	Document Title	Application
LMS-CP-5505	Flight Project and Experiments Review Planning and Implementation in accordance with NPD 7120.5A	Performance of work
LMS-CP-5508	Ad Hoc Technical Review (Including Tiger Teams)	Performance of work
LMS-CP-5528	Software Planning, Development, Acquisition, Maintenance, and Operations	Performance, verification, and management of work
LMS-CP-5610	Development of Construction of Facilities (CoF) Program Plan	Performance of work
LMS-CP-5620	Facility Systems Engineering Process	Performance and management of work
LMS-CP-5621	Facility Systems Project Review	Performance of work
LMS-OP-5692	Facility Systems Procedures for Processing RFCs and EFDCs	Performance of work
LMS-OP-5694	Facility Systems Project Review Requirements	Performance of work

1.5 Control of LMS Documentation and Data

All LMS policies and procedures are maintained by LaRC's LMS Documentation Library, an electronic media system that can be found at http://lms.larc.nasa.gov. Procedures used to perform, verify, and manage work at LaRC are controlled through the LMS Documentation Library. Langley Forms (LF) are defined as a form approved by management, for inclusion in the Langley Forms System, to implement management controls. LF's are also controlled through the LMS Documentation Library. External forms are used extensively, but LaRC does not control the content and format.

Agency documents are considered external documents because of the Agency approach taken towards registration. Each NASA center holds individual registrations for ANSI/ISO/ASQ Q9001-1994 compliance.

Requirements to use external documents to perform work are referenced in LaRC work authorization documents (for example, SAA's, IA's, TA's, Fabrication Work Requests). It is the responsibility of each OUM to ensure employees are provided with pertinent external documents enabling them to meet product user, funder, or LaRC requirements.

There are four LaRC controlled document servers – the Langley Directives Management System (LDMS); the Langley Procedures System (LPS), Configuration Management On-line (CMOL), and Langley Forms System (LFS). Electronic master lists are generated for the documents controlled by each server.

Office of the Director personnel are the approval signatories for the Policy Manual, Organizational Unit Plans (OUP's), Langley Policy Directives (LaPD's), Langley Procedures and Guidance documents (LaPG's), Center Procedures, and Organizational Procedures. Task Descriptions and Langley Forms are approved by the OUM responsible for the work activity. Standard Operation Documents are approved based on the scope and criticality of the activities being performed. All the above documents are recognized as LMS instructional policies and procedures.

Document control procedures describe the methods for communicating changes or cancellations to LMS documents. Employees are responsible for preventing use of obsolete documents for the performance of work. This is accomplished by destroying obsolete versions of documents. Where obsolete external documents are required to be used, their intended use is identified.

The procedures used to control LMS documentation and data are described in the following documents:

Reference	Document Title	Application
LMS-CP-1904	Program and Project Configuration Management	Performance of work
LMS-CP-2301	Development, Revision, Cancellation and Control of Langley Procedure System Documents	Performance of work

Reference	Document Title	Application
LMS-CP-2701	LaRC Directives Initiation, Review, and Approval	Performance of work
LMS-CP-4108	Updates and Approvals of Changes to Langley Home Page (www.larc.nasa.gov)	Performance of work
LMS-CP-4710	Configuration Management for Facilities	Verification of work
LMS-CP-5510	Aerospace Systems Change Control within Systems Engineering	Performance of work
LMS-CP-5529	Software Configuration Management Planning for Low-, High-, and Critical-Control Software	Performance of work
LMS-CP-5907	Forms Management	Performance of work
LMS-CP-5909	Development, Review and Maintenance of Web Sites in the LaRC Domain	Performance of work
LMS-OP-0907	Flight Operations Support Center Configuration Management and Change Control	Performance of work
LMS-OP-0914	Configuration Management and Change Control for Simulator Hardware	Performance of work
LMS-OP-5686	Facility Systems Project Document Control	Performance of work

1.6 Procurement of Goods and Services

LaRC purchasing is governed by federal procurement laws as implemented by the Federal Acquisition Regulations (FAR), NASA FAR Supplement (NFS), NASA Procurement Information Circulars (PICs), and local policies and procedures.

The procurement official evaluates and selects responsible contractors on technical and quality assurance requirements as well as cost. The requirements are established and evaluated by technical experts. The contracting officer evaluates cost. The procurement official maintains records of evaluation, selection, and performance of contractors.

Methods of procurement available to the procurement officials include purchase card, simplified acquisition, contracts, and task orders or delivery orders against Agencywide or Governmentwide contracts.

Purchasing documents provided to our contractors clearly describe the product ordered. Descriptions include the type, class, grade, or other precise identification; applicable specifications, standards, or drawings; process requirements; inspection instructions; and other relevant technical data. Also, the purchasing documents contain the title, number, and issue of any standard to be applied. The purchasing official reviews and approves purchasing documents for adequacy of specified requirements before release.

LaRC has developed controls to ensure incoming products conform to requirements, incorporating visits to contractors to perform source surveillance, product verification and acceptance. Responsibility for release of product following visits to contractor's facilities by LaRC representatives and LaRC product users is defined in the purchasing data provided to the vendor. Contractor specification documents are used to perform verification at contractor facilities.

In certain cases, quality assurance requirements dictate that vendors have a quality management system that is compliant to ANSI/ISO/ASQ Q9001-1994. Each procurement is assessed independently to determine the benefit of compliance to the Government and the vendor. Compliance is assessed through the provision of quality management system documentation specified in the Request for Proposal. LaRC reserves the right to perform quality management system assessments at any time during the period of performance should the vendor demonstrate difficulty in meeting contractual requirements.

The procedures used for procurement activities are described in the following documents:

Reference	Document Title	Application
LMS-CP-0510	Procurement of Inspection, Measuring and Test Equipment (IM&TE)	Performance of work
LMS-CP-1708	Selection for Small Business Innovation Research (SBIR) Awards (Phases I and II)	Performance of work
LMS-CP-2711	Obtaining Office Furnishings through Government Sources	Performance of work
LMS-CP-2741	Supply and Equipment Management Officer Review of Solicitations and Contracts	Performance of work
LMS-CP-3102	Contract Litigation Before the Armed Services Board of Contract Appeals (ASBCA)	Performance of work
LMS-CP-4501	Procurement Process Overview	Performance of work
LMS-CP-4502	Simplified Acquisition Process	Performance of work
LMS-CP-4504	Market Research for Procurements	Performance of work
LMS-CP-4505	Prepare Purchase Request (PR) and Supporting Documents	Performance of work
LMS-CP-4523	Contractor Performance Monitoring	Performance of work
LMS-CP-4532	Procurement-Related Discussions with Potential Bidders/Offerors	Performance of work
LMS-CP-4534	Purchase Request Cancellation	Performance of work
LMS-CP-4535	NASA Research Announcements (NRA)	Performance of work
LMS-CP-4540	Procurement Purchase Card	Performance of work
LMS-CP-4543	Receipt and Evaluation of Unsolicited Proposals	Performance of work
LMS-CP-4703	Review of Purchase Requests by the Office of Safety and Mission Assurance (OSMA)	Performance of work
LMS-CP-4707	Office of Safety and Mission Assurance (OSMA) P-297 Review	Verification of work
LMS-CP-4751	Response to Requests for Mission Assurance Support in Proposal or Contract Development	Performance of work
LMS-CP-5532	Software Acquisition Planning	Performance of work
LMS-CP-5593	Contract Administration for SCOMAC and CAPSS Contracts	Management of work
LMS-CP-5902	Review and Approval of Purchase Requests for Information Technology Products and Services	Performance of work
LMS-OP-2702	Logistics Performance Monitor Surveillance Plan Development	Performance of work
LMS-OP-2703	Logistics Point of Contact Surveillance Plan Development	Performance of work
LMS-OP-2704	Logistics Contract Criteria Development	Performance of work
LMS-OP-2710	Documenting and Reporting Logistics Contractor Performance	Performance of work
LMS-OP-2726	Stock Purchase Orders	Performance of work
LMS-OP-3907	Equal Employment Opportunity Contract Compliance for Contracts Exceeding $10 Million	Performance of work
LMS-OP-4106	Public Services Contract Performance Evaluation	Performance of work
LMS-OP-4506	Assign Buyer	Performance of work
LMS-OP-4507	Small, Small Disadvantaged and Women-Owned Business Involvement in Procurements	Performance of work
LMS-OP-4508	Generate Milestones	Performance of work
LMS-OP-4509	Prepare Presolicitation Documents	Performance of work
LMS-OP-4510	Synopsis of Solicitations	Performance of work
LMS-OP-4511	Prepare Draft Requests for Proposal	Performance of work
LMS-OP-4512	Conducting Presolicitation and Prebid/Preproposal Conferences	Performance of work
LMS-OP-4513	Generate Solicitation Document	Performance of work
LMS-OP-4514	Solicitation Issuance	Performance of work
LMS-OP-4515	Receipt of Offers	Performance of work
LMS-OP-4516	Perform Evaluation	Performance of work
LMS-OP-4517	Prepare Evaluation Documents	Performance of work
LMS-OP-4518	Make Selection	Performance of work

Reference	Document Title	Application
LMS-OP-4519	Process Selection Document	Performance of work
LMS-OP-4520	Prepare Contractual Documents	Performance of work
LMS-OP-4521	Prepare Management Reports	Performance of work
LMS-OP-4522	Delegation of Contracting Officer Responsibilities	Performance of work
LMS-OP-4524	Task/Delivery Order Issuance and Administration	Performance of work
LMS-OP-4525	Evaluate Contractor Performance	Performance of work
LMS-OP-4526	Issue Changes and Modifications	Performance of work
LMS-OP-4527	Process Disputes and Appeals	Performance of work
LMS-OP-4528	Perform Termination Functions	Performance of work
LMS-OP-4529	Invoice Review and Approval	Performance of work
LMS-OP-4530	Administration of Deliverables	Performance of work
LMS-OP-4531	Close-Out of Procurement Files	Performance of work
LMS-OP-4533	Distribution of Procurement Documents	Performance of work
LMS-OP-4537	Review and Execution of Procurement Documents	Performance of work
LMS-OP-4538	Buyer's Guide for Simplified Acquisition	Performance of work
LMS-OP-4539	Protests	Performance of work
LMS-OP-4544	Grant and Cooperative Agreement Processing	Performance of work
LMS-OP-4546	Sealed Bid Opening	Performance of work
LMS-OP-4553	Contracting Officer Procurement Authority	Performance of work
LMS-OP-4701	OSMA Contract Management	Performance of work
LMS-OP-5641	Contractual Resource Management for Fabrication	Performance of work
LMS-OP-5684	SERFIS Delivery Order Processing	Management of work
LMS-OP-5685	MA/ES Task Order Processing	Management of work
LMS-OP-5691	Facility Systems Bid Package Development	Performance of work
LMS-OP-5693	Facility Systems Construction Contract Closeout Process	Performance of work

1.7 Control of Property Owned by Parties External to NASA

Property owned by parties external to NASA is controlled from receipt until return to the owner or until incorporation of the property into higher-level assemblies. Identification of defects upon receipt of hardware or during use is recorded and reported to the owner. Loss or damage to hardware during use is dealt with in the same manner. Damage to externally owned property caused by LaRC personnel are recorded in the LaRC corrective action system for remedial action.

Property owned by parties external to NASA may be brought on site, with control of the property being retained by the owner. In these cases, this section of ANSI/ISO/ASQ Q9001-1994 is not applicable to LaRC.

The procedure used for handling externally owned property is described in the following document:

Reference	Document Title	Application
LMS-CP-2740	Control of Property Owned by Parties External to NASA	Performance of work

1.8 Systems and Component Identification and Traceability

Where specified by an external party or in accordance with LaRC policy, methods to control identification and traceability of systems are established to control component materials, including their source data. Controls are initiated once a requirement is identified and extend through fabrication and delivery or installation.

Controls are maintained to incorporate engineering changes that affect systems configuration. When required, additional documentation is generated for identification of modified systems to maintain traceability.

Specific identification and traceability procedures have not been developed due to the nature of work. Methods to control identification and traceability of materials are developed and documented upon receipt of the external party's requirements.

1.9 Control of Work and Management Processes

Procedures and instructions have been developed to ensure assembly, processing, and mission and support activities are performed under controlled conditions. Process procedures control activities performed in the Office of the Director, program offices, research and technology competencies, and business management offices.

Activities span research and experimentation, mission assurance, law, financial and human resource management, outreach, commercialization, logistics and information management. Controls for all activities comply with the requirements stipulated in ANSI/ISO/ASQ Q9001:1994 as follows:

- Development of procedures to control activities
- Provision of suitable equipment to perform work
- Conducive environment for performance of work
- Compliance with internal and external documentation, including laws and regulations
- Process monitoring
- Approval of new equipment and processes as they are acquired and implemented
- Workmanship standards

The procedures used to describe process control activities are accessible through the Langley Management System Documentation Library.

1.10 Inspection and Testing of Systems and Components

LaRC personnel are required by the FAR to ensure that receipt inspection is performed on all non-commercial-off-the-shelf products. This regulation does not permit the bypass of material inspection when items are urgently required. At LaRC, this work is performed on behalf of the Government by contractor personnel under civil service employee management oversight.

LaRC personnel are also required by the FAR to perform receipt verification on commercial-off-the-shelf products prior to acceptance and use. This receipt verification ensures that the order was filled correctly and that the product works.

Testing is performed at LaRC for two purposes. The first purpose is the traditional method of verifying performance of fabricated hardware and associated software. The second purpose is to verify the accuracy of LaRC research products – such as wind tunnel or laboratory experimentation. Wind tunnel and laboratory experimentation are subject to the controls described in Section 1.9, Control of Work and Management Processes.

Documented procedures for all inspections and tests are either in place or are developed during planning activities. Civil service and contractor personnel perform inspections and tests of systems and components. Where contractor personnel are responsible for performing inspection and test activities, civil service employees are responsible for providing management oversight for the activity.

LaRC's final acceptance of inspection and test results is performed in accordance with program or project plans. Authorization by closeout and sign-off of all associated documentation is completed prior to final release of the product or system. Certificates of Flight Readiness or functional equivalents are completed prior to vehicle take-off or launch and are retained as final inspection and test records. Civil service and contractor personnel are responsible for record retention. Regardless of the custodian, all records are available to internal assessors and external auditors.

The procedures used to handle, inspect, and test systems and components are described in the following documents:

Reference	Document Title	Application
LMS-CP-4706	Monitoring and Reporting of Receipt Inspection and Quality Assurance Testing Results Performed by the Receipt Inspection and Quality Assurance Lab	Management of work
LMS-CP-4758	Receipt Inspection for Safety-Critical Products	Verification of work
LMS-CP-4759	Receipt, Handling, Storage, Marking, Preservation and Delivery of Hazardous Materials	Verification of work
LMS-CP-5506	Aerospace Systems Implementation, Testing and Integration	Performance of work
LMS-OP-0912	Aircraft Maintenance, Inspection and Flight Release	Performance, verification and management of work
LMS-OP-2717	Government Receipt and Inspection Signature Process	Performance of work
LMS-OP-5509	Aerospace Systems Environmental Testing	Performance of work

1.11 Control of Inspection, Measurement and Test Equipment

The integrity of equipment is an important aspect of LaRC's testing and experimentation activities. Accurate instrumentation is critical to mission success. To this end, traceable calibration to national and international standards is performed onsite and at contractor laboratories.

The intervals for hardware calibration have been established. These intervals are monitored and amended on the basis of calibration results and are used in a recall system to notify users when critical equipment is due for calibration. Infrequently used items are calibrated prior to use. Operational and storage conditions are maintained to assure accuracy throughout the calibration interval. Inspection, testing, and experimentation equipment that is found to be out of tolerance is evaluated for impact on previous test or experiment results.

The procedure used to control inspection, measuring, and test equipment and verification software is described in the following document:

Reference	Document Title	Application
LMS-CP-0506	Selection, Use and Control of Inspection, Measuring and Test Equipment (IM&TE)	Performance of work

1.12 Inspection and Test Status of Systems and Components

Various methods of demonstrating test status of hardware and verification of software are in use. Inspection, test, and verification records are all used as indicators to demonstrate that inspections and tests, and/or verifications have been performed and if the test item is acceptable for further processing or delivery.

The integrated processes for inspection and test status activities for systems and components are referenced in Sections 1.9 and 1.10 of this document.

1.13 Control of Systems and Components That Fail to Meet Requirements

Of the products produced by LaRC, only software developed or hardware fabricated at LaRC by civil service personnel that is identified as not meeting documented requirements following verification or testing are subject to the nonconforming product system. Other problems associated with LaRC's work activities, including research results and higher level assemblies, are captured and resolved through the corrective and preventive action system described in Section 1.14 of this document.

Fabrication at LaRC is defined as hardware produced by civil service personnel utilizing one or more of the following processes: machining, drilling, crimping, heat treatment, coating, soldering, welding, grinding, bending, cutting, forming, casting or molding. Fabrication does not include assembly. Assembly at LaRC is defined as integration of fabricated hardware and software components into higher level assemblies.

Acquired products that do not meet documented requirements are not classified as LaRC nonconforming product. Acquired hardware and software products found to be nonconforming, following modification by LaRC, are treated as nonconforming product.

LaRC uses a Nonconformance-Failure Report system to document civil service employee disposition of space hardware and software problems, whether found in acquired product or LaRC-developed product. This system dispositions problems without regard for their classification according to Section 4.13, Control of Nonconforming Product, ANSI/ISO/ASQ Q9001-1994.

Software and hardware that does not conform to requirements are put under control until the disposition of the product is determined and the product is reworked or repaired. Nonconforming product details are recorded and reported to determine possible courses of corrective action.

The procedures used to control and disposition nonconforming product are described in the following documents:

Reference	Document Title	Application
LMS-CP-5507	Reporting and Disposition of Nonconforming Aerospace Hardware Items and Products	Performance of work
LMS-CP-5643	Fabrication and Inspection Operations Sheets (FIOS) Administration Following Revisions, Operation Changes and Identification of Nonconformances	Performance of work
LMS-CP-5645	Monthly Assessment of Nonconforming Product for Entry Into CAP Tracs	Performance of work
LF 143	Nonconformance-Failure Report (NFR)	Performance of work

1.14 Corrective, Preventive, and Improvement (CPI) Action System

Definitions:

- Fix - a temporary measure taken until the root cause(s) is identified and corrective action is implemented
- Symptom - outward manifestation of underlying cause(s)
- Root cause - a underlying issue or group of issues that negatively impact work operations
- Corrective action - action taken to correct a problem and to prevent it from recurring
- Preventive action - action taken to prevent a potential problem from occurring
- Improvement - actions taken to improve effectiveness of operations that do not result from an existing or potential problem

A CPI action system has been designed to enable continuing improvement of LaRC research products and services. This is accomplished through ongoing review and improvement of policies, methods, and practices, including related documentation, used by all LaRC employees to manage, perform, and verify work. The system is also used to record, report, and disposition product user, funder, and employee feedback.

As a result of LaRC's role as a government research laboratory, there is not a traditional customer-supplier relationship. LaRC's product users are often partners in development of technology and scientific research results while funding for these efforts is provided by the government as a third party. Feedback on research programs is received from ad hoc steering committees comprised of product user representatives from industry, academia, and government that perform regular program reviews. The feedback is assessed and appropriate actions are initiated. In addition, the Wind Tunnel Feedback Panel is responsible for analyzing the results of exit surveys. Nonconformance data relating to fabricated hardware and LaRC developed software is monitored for emerging trends. Significant issues are evaluated and appropriate CPI actions are taken to improve operations. These inputs are captured and documented using the Corrective and Preventive Action Tracking System (CAP Tracs). CAP Tracs is an electronic tool used for initiating and monitoring the corrective, preventive, and improvement actions. Related trends and systemic issues are discussed at Quarterly Management Reviews to support management decisions.

To manage resources effectively, it is the policy of senior management that decisions to take CPI actions are based upon organizational and programmatic risk factors. Criticality, risk, cost/benefit, and feasibility are criteria used to determine when corrective, preventive, or improvement action will be taken.

The procedure used to control corrective, preventive, and improvement action is described in the following document:

Reference	Document Title	Application
LMS-CP-2303	Corrective and Preventive Action Resulting from Internal Assessment, External Audit and LMS Feedback from Product Users, Funders and Employees	Performance of work

1.15 Material Handling, Storage, Packaging, Preservation, and Delivery

1.15.1 General

Procedures have been developed and implemented for handling, storage, packaging, and delivery activities.

1.15.2 Handling

Extensive handling processes are employed for all materials, instrumentation, and equipment used at LaRC. Personnel are sensitive to the nature of items being handled and are trained in the use of handling equipment. Protective handling measures are implemented when placing materials, instrumentation, and equipment in storage, during production and on- and off-site delivery.

1.15.3 Storage

Suitable storage facilities for materials, instrumentation, and equipment include the use of bonded stores. Items are identified and assigned safe storage conditions to ensure protection, inventory control, and ease of retrieval. Environmentally controlled conditions are maintained to protect those items subject to deterioration and/or limited shelf life. All stored items are monitored for potential deterioration while in storage.

1.15.4 Packaging

Suitable protective packaging is designed and constructed on-site, or procured from commercial sources, to protect all materials, instrumentation and equipment. This protection is extended to item handling, storage, and delivery to on- and off-site locations. Labeling of packaged items is an integral aspect of the packaging process. Special instructions are provided to handlers to ensure that material, instrumentation and equipment integrity is maintained.

1.15.5 Preservation

Preservation activities are performed to preserve items while in storage and during the production activities. When required, preventive maintenance and calibration of equipment is performed while in storage to ensure readiness for use or delivery.

1.15.6 Delivery

When LaRC has responsibility for delivery of materials, instrumentation, or equipment to on- and off-site locations, the nature of the material is assessed to determine the degree of protection necessary to ensure integrity. Control extends to selection of vehicle type, loading considerations including size, weight, and stability and delivery route selection. Special instructions are provided to delivery drivers to ensure that material, instrumentation, and equipment integrity is maintained.

The procedures used to control material handling, storage, packaging, preservation, and delivery are described in the following documents:

Reference	Document Title	Application
LMS-CP-2725	Additions to Stock	Performance of work
LMS-CP-4756	Handling, Preservation, Storage, and Shipping of Space Flight Hardware	Verification of work
LMS-CP-4757	Models Handling, Preservation, Inventory Control, Shipping, and Packaging	Verification of work
LMS-CP-4891	Handling, Storage, Marking, Preservation and Delivery of Classified Information	Verification of work
LMS-CP-4892	Bonded Storage	Verification of work
LMS-CP-5514	Controlled Stores	Performance of work
LMS-OP-2739	Inventory Schedule Reporting Requirements	Management of work

1.16 Record Collection and Retention

The Agency defines official permanent and temporary records that must be retained with their retention, disposition, and archive requirements. Each OUM uses a record form to identify all federal records that must be retained in accordance with Agency policy, and as a result of execution of policies and procedures.

Federal records that must be retained are identified through the use of initial capital letters in CP's and OP's. However, NPD's, NPG's, LAPD's, LAPG's, and Standard Operation Documents do not use this convention. It is the additional responsibility of OUM's to identify federal records that must be retained on the Record Form as a result of execution of policies and procedures described by these documents.

For each OU, the Record Form, Langley Form 192, must be used to identify:

- all federal records to be retained
- the responsibility for completion of each record listed
- the location of each record listed
- the retention and archive periods of each record listed

Each OUM is responsible for keeping their Record Form current and ensuring that the record retention requirements are met.

The procedure used for record collection and retention is described in the following document:

Reference	Document Title	Application
LMS-CP-2707	Records Management	Performance of work

1.17 Internal Assessment Program

The internal assessment function evaluates the ongoing implementation and effectiveness of the LMS. When developing the assessment schedule consideration is given to the criteria listed below:

- Requests for assessments from OUM's
- Changes in organization, products or services
- Changes in direction following management review decisions
- Corrective, preventive, and improvement action trends
- External audit reports
- Prior internal assessment results

It is LaRC policy to reserve assessment resources for those areas where problems occur or where current operations impact mission success. When an OUM has demonstrated control through previous assessments, their area(s) shall receive limited review until a need is identified based on the criteria previously stated.

Fulltime Lead Assessors have been assigned to the Internal Assessment Program to insure independence and required objectivity. Additional employees have been trained to support the full-time Lead Assessors in conducting assessments. The importance of independence is understood; therefore, deployment of internal assessors is made based on their knowledge and independence of the activity under assessment. All internal assessors are given a minimum of 16 hours formal classroom training and 8 hours practical experience prior to performing internal assessments. All lead internal assessors are given a minimum of 36 hours of formal classroom training.

The procedure used to control the internal assessment program is described in the following document:

Reference	Document Title	Application
LMS-CP-2305	Internal Assessment	Performance of work

1.18 Employee Training

All civil service positions are classified by the government based on Federal regulation. As a precondition to placement, all candidates must be qualified to perform the duties of the position. By definition, any individual not qualified for a position may not be considered for placement.

Upon placement or reassignment, all employees are provided with the training necessary to support LaRC's values as described in Section 1.1.1. Training is divided into three categories.

Required Training
Training that is required by Agency policy, Center policy, law, regulation, or LaRC management for an employee to perform LaRC-specific work activities safely and effectively.

Examples of required training include:

- Training for safety and other certifications
- Training for the operation of specialized and other equipment
- Training required to implement LMS management controls documented in Agency and LaRC policies and procedures
- Contracting Officer's Technical Representative (COTR) training
- New supervisor training

Each OUM is responsible for identification of required training needs on the Required Training Needs and Record Form, Langley Form (LF) 194, for work activities performed within the organizational unit. Only Required Training is listed on the LF 194. Supervisors are responsible for ensuring that each employee receives the required training and that receipt of the training is recorded.

Mandatory Training
Training mandated by the Center Director for all employees or specific groups of employees. This training is defined on an annual basis and may vary from year to year.

Examples of mandatory training:

- Ethics training for supervisors
- Multicultural Diversity Training
- Safety and security briefings

Developmental Training
Developmental Training is training that is intended to develop the employee for the future or enhance existing skill sets. If an employee desires an Individual Development Plan, it is the employee's responsibility to initiate it following LMS-CP-4312.

Examples of developmental training:

- Academic courses
- Seminars/conferences
- Advanced skills training
- Executive programs/fellowships
- Agency Professional Development Program (PDP)

All required training performed after July 4, 1999, is documented as described above.

The procedures used for managing employee training are referenced in the following documents:

Reference	Document Title	Application
LMS-CP-4309	Identification and Recording of Required Training	Performance of work
LMS-CP-4312	Individual Development Plan	Performance of work
LMS-CP-4316	Training Needs Assessment	Performance of work
LMS-CP-4318	Mandatory Training	Performance of work

1.19 Servicing of LaRC Products and Services

This section of ANSI/ISO/ASQ Q9001-1994 does not apply to LaRC's operations.

1.20 Use of Statistical Techniques at LaRC

Due to nature of the work performed, statistical techniques for verifying process capability and product characteristics are not used at LaRC.